

REMARKS

The July 15, 2003 Office Action rejects all pending claims 1-33. In view of the remarks set forth below, Applicants respectfully request reconsideration and allowance of all pending claims.

35 U.S.C. 103 Rejections

As a preliminary matter, Applicants submit that United States Patent No. 6,409,580 in the name of Lougher et al. 2002 (hereinafter "Lougher et al.") is owned by Assignee of the present invention, and the subject matter of the Lougher et al. patent and the claimed invention were, at the time the invention was made, subject to an obligation of assignment to the same company. Furthermore, Lougher et al. did not issue until after the filing date of the present application, so it qualifies as prior art only under 35 U.S.C. 102(e)--thus, the reference is disqualified as prior art under 35 U.S.C. 103 (c).¹

Lougher et al. in view of Jeng

Claims 1-9, 26-29, 32, and 33 stand rejected under 35 U.S.C as being unpatentable over Lougher et al. in view of United States Patent No. 6,054,769, issued to Jeng on April 25, 2000 (hereinafter "Jeng").

¹ Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the

Jeng generally discloses a workpiece including low-k dielectric material. According to Jeng, the low-k material is selectively placed in desired areas by spinning the low-k material onto the workpiece surface and removing any excess material by *etching* (column 3, lines 4-6 and column 4, lines 33-34). Jeng further discloses that due to poor adhesion and other problems associated with low-k material, intermetal dielectric is deposited over the low-k material and polished or planarized (column 3, lines 11-16). Thus, Jeng teaches that polishing can be used for non-low-k dielectric materials, but it is not suitable for low-k materials. Accordingly, Jeng teaches away from the claimed invention and therefore does not anticipate or render obvious the claimed invention.

Additionally, because Laugher et al. is an improper 35 U.S.C. 103 reference, it cannot be combined with any other reference to render the claimed invention obvious. Accordingly, Applicants respectfully request that this rejection to claims 1-9, 26-29, 32, and 33 be reconsidered and withdrawn.

The Examiner states that various limitations in the dependent claims are obvious in view of the cited references because “it would be obvious to one having skill in the art at the time the invention was made to make the invention of Lougher et al. with the ...limitation, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimal or workable ranges involves only routine skill.” Applicants submit that because no reference sets for the general conditions of using an orbital polisher to remove material from a workpiece including low-k material, the additional limitations are not obvious in view of the cited art. Specifically, no combination of references suggests any orbital speed, any orbital

invention was made, owned by the same person or subject to an obligation of assignment to the same person. 35 U.S.C. 103(c).

radius, any speed of movement of the workpiece relative to the polishing head, any pressure, or any slurry flow rate for removing material from a workpiece including low-k material. Accordingly, none of the dependent claims including such limitations are obvious in view of the cited references.

Claims 2, 4-6 and 9 are additionally allowable the cited reference. Claim 2 is additionally allowable over the cited reference because the reference does not teach or suggest “platen is configured to orbit at about an axis at about 1000 orbits per minute.” Claim 4 is additionally allowable over the reference because the reference does not teach or suggest “an orbital radius of about 0.25 to about 1 inch.” Claims 5 and 6 are additionally allowable over the reference because the reference does not teach or suggest “platen...configured to move the workpiece relative to the polishing surface at a speed of about 0.8 to about 3.2 meters per second” as set forth in claim 5 or “the carrier is configured to apply about 0.25 to about 2 pounds per square inch pressure to the workpiece in the direction of the polishing surface” as set forth in claim 6.

Claim 26 is not obvious over the cited reference because the reference does not teach or suggest “A method for removing material from a surface of a workpiece, including low-k material” or “providing a workpiece comprising low-k material” or “placing the workpiece comprising low-k material in contact with a polishing surface” or “orbiting the polishing surface at a speed about 500 to about orbits per minute.” Furthermore, Jeng only teaches *etching* low-k material—it does not in any way teach or suggest polishing low-k material. Accordingly, Applicants request that the Examiner reconsider and withdraw the 35 U.S.C. §103(a) rejection to claims 26-29.

Claims 32 and 33 are similarly patentable over the cited reference because the reference does not teach or suggest “a workpiece carrier proximate the polishing surface, wherein the platen and the workpiece carrier are configured such that the surface of the workpiece comprising a low dielectric constant material and the platen move at a relative speed of about 0.8 to about 3.2 meters per second” as set forth in claim 32 or “A method for removing material from a surface of a workpiece, including low-k material” or “providing a workpiece comprising low-k material” or “placing the workpiece comprising low-k material in contact with a polishing surface” or “moving the polishing surface and the workpiece comprising low-k material relative to each other at a speed of about 0.8 to about 3.2 meters per second” as set forth in claim 33. Applicants therefore request that the Examiner additionally withdraw this rejection to claims 32 and 33.

Lougher et al. in view of Jeng and in further view of Chen et al.

Claim 10 stands rejected under the 35 U.S.C. §103(a) as being unpatentable over Lougher et al. in view of Jeng and in further view of United States Patent No. 6,241,593 B1, issued to Chen et al. June 5, 2001 (hereinafter “Chen et al.”). Applicants traverse this rejection.

Chen et al. generally discloses a carrier head, including a bladder, for use with a rotary platen polishing apparatus. Nowhere does Chen et al. teach or suggest that the polishing head disclosed in Chen et al. could be used with a polishing apparatus including an *orbiting polishing station or polishing a workpiece comprising low-k material*. Thus, it would not be obvious to one skilled in the art to combine Jeng with Chen et al., and even if the references were combined, the combination of the references does not teach or suggest each and every element of claim 1, from which claim 10 depends. Specifically, no combination of the references teaches or

suggests “An apparatus for polishing a surface of a workpiece, the surface including a low dielectric constant material” or “a platen configured to orbit about an axis at a speed up to about 2000 revolutions per minute.” Accordingly, claim 10 is allowable over the cited references and Applicants respectfully request that the Examiner withdraw this rejection to claim 10. Furthermore, as noted above, Lougher et al. cannot be combined, under 35 U.S.C. 103 to render the claimed invention obvious. Applicants therefore request that the Examiner reconsider and withdraw this rejection to claim 10.

Lougher et al. in view of Jeng and in further view of Kawamoto et al.

Claims 11, 30, and 31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lougher et al. as modified by Jeng in view of United States Patent No. 6,416,384 B1, issued to Kawamoto et al. July 9, 2002 (hereinafter “Kawamoto et al.”). Applicants traverse this rejection.

Similar to Chen et al., Kawamoto et al. only discloses a polishing apparatus including a rotating polishing table. Nowhere does Kawamoto et al. teach or suggest an orbiting polishing apparatus or how one could combine the rotary platen teachings of Kawamoto et al. with the workpiece disclosed in Jeng to form the claimed invention. Furthermore, even if Kawamoto et al. were combined with Jeng, the combination does not teach each and every element of the claimed invention. Specifically, the combination does not teach or suggest “An apparatus for polishing a surface of a workpiece, the surface including a low dielectric constant material” or “a platen configured to orbit about an axis at a speed up to about 2000 revolutions per minute” as set forth in claim 1, from which claim 11 depends or “A method for removing material from a surface of a workpiece, including low-k material” or “providing a workpiece comprising low-k

material" or "placing the workpiece comprising low-k material in contact with a polishing surface" or "orbiting the polishing surface at a speed about 500 to about orbits per minute" as set forth in claim 26, from which claims 30 and 31 depend. Accordingly, Applicants request that the Examiner reconsider and withdraw this rejection to claims 11, 30, and 31.

Chen et al. in view of Aizawa et al. and in further view of Jeng

Claims 12-17, 20 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. in view of United States Patent No. 6,036,582, issued to Aizawa et al. on March 14, 2000 (hereinafter Aizawa et al.) in further view of Jeng. Applicants traverse this rejection.

Aizawa et al. generally discloses a chemical mechanical polishing apparatus divided into a plurality of rooms cleaned to different degrees. Nowhere does either Aizawa et al. or Chen et al. teach or suggest any polishing apparatus or technique for removing material from a workpiece including low-k material as set forth in independent claims 12 and 25. Several of the limitations of these claims as well as the respective dependent claims are directed to apparatus or process techniques designed to remove particular material from a surface of a workpiece including low-k material. Because neither Aizawa et al. nor Chen et al. teach or disclose apparatus or method for removing material from a workpiece that includes low-k material and Jeng only teaches removing low-k material using an *etch process*, no combination of the references renders obvious any of Applicants' claims directed to removing material from a workpiece including low-k material. Furthermore, as the Examiner acknowledges, no combination of the references teaches or suggests a "platen configured to move relative to a workpiece surface at about 0.8 to about 3.2 meters per second and a workpiece carrier configured to apply about 0.25 to about 2

psi to a workpiece in the direction of the platen" as set forth in claim 25. Accordingly, Applicants request that the Examiner withdraw this rejection to claims 12-17, 20, and 25.

Chen et al. in view of Aizawa et al. in further view of Jeng, and further in view of Lougher et al.

Claims 18, 19, 22, and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. as modified by Aizawa et al. and Jeng and in further view of Lougher et al. Applicants traverse this rejection.

As previously noted, none of the cited references teach or suggest any method or apparatus to remove material from a surface of a workpiece comprising low-k material using polishing techniques. Furthermore, no combination of these references teaches or suggests "A polishing system for removing material from a wafer surface, the wafer including low-k material" or "a plurality of polishing stations, wherein at least one of said plurality of polishing stations includes a platen configured to move at about 0.8 to about 3.2 meters per second relative to the wafer comprising low-k material" as set forth in claim 12, from which claims 18, 19, 22, and 24 depend. In addition, Lougher et al. is an improper 35 U.S.C. 103 reference and therefore cannot be combined with other references to render the claimed invention obvious. Applicants therefore request that the Examiner reconsider and withdraw this rejection to claims 18, 19, 22, and 24.

Chen et al. in view of Aizawa et al. in further view of Kawamoto et al.

Claims 21 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. in view of Aizawa et al. in further view of Kawamoto et al. Applicants traverse this rejection.

Claim 12 is not obvious in view of the cited references because no combination of these references teaches or suggests “A polishing system for removing material from a wafer surface, the wafer including low-k material” or “a plurality of polishing stations, wherein at least one of said plurality of polishing stations includes a platen configured to move at about 0.8 to about 3.2 meters per second relative to the wafer comprising low-k material.” Accordingly, claims 21 and 23 that depend from claim 12 are not obvious in view of the cited references and Applicants therefore request that the Examiner reconsider and withdraw this rejection to claims 21 and 23.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and completed response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If, for any reason, the Examiner determines that one or more of the pending claims are not allowable, the undersigned respectfully requests a telephone call to discuss the matter.

Respectfully submitted

Date: 15-OCT-2002

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